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EXAMINER	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ALBERT CHAN

Appeal 2008-3402
Application 10/663,207
Technology Center 1700

Decided: July 11, 2008

Before EDWARD C. KIMLIN, CATHERINE Q. TIMM, and LINDA M. GAUDETTE, *Administrative Patent Judges.*

KIMLIN, *Administrative Patent Judge.*

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1-31, and 33.

Claim 1 is illustrative:

1. A method of dissipating heat generated by an electronic component, comprising the step of attaching the electronic component to a heat receiving surface using a thermal adhesive, wherein the thermal adhesive comprises:

a mixture of a curable polymer composition, a solder powder, and a fluxing agent, and

wherein the step of attaching comprises heating said mixture to a temperature above the melting point of said solder powder, such that the solder reflows to form interconnecting metal structures dispersed in the polymer matrix prior to the time the polymer becomes cured, and thereafter curing the polymer matrix such that the adhesive paste hardens.

The Examiner relies upon the following references in the rejection of the appealed claims:

Kirsten	WO 97/07542	Feb. 27, 1997
Nakajima	JP 13284401 A	Oct. 12, 2001
McCormack	US 2001/0030062 A1	Oct. 18, 2001
Nguyen	US 2001/0038093 A1	Nov. 8, 2001
Pennisi	5,128,746	Jul. 7, 1992
Dietz	6,265,471 B1	Jul. 24, 2001
Koning	US 2003/0150604 A1	Aug. 14, 2003
Bish	6,906,413 B2	Jun. 14, 2005
Jayaraman	6,926,955 B2	Aug. 9, 2005

Appellant's claimed invention is directed to a method of dissipating heat that is generated by an electronic component. The method entails attaching the component to a heat receiving surface using a thermal adhesive. The adhesive comprises a curable polymer composition, a solder powder and a fluxing agent. When the temperature of the thermal adhesive composition is above the melting point of the solder powder, the solder reflows to form interconnecting metal structures dispersed in the polymer matrix. After the interconnecting metal structures are formed the polymer matrix is cured and hardened.

The Examiner has entered 31 separate rejections against the appealed claims. We will mention only those substantively argued by Appellant.

Appealed claims 1, 3, 4, 6, 7, 9-13, 16, 17, 19-23, 28, 29, and 31 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Nguyen. Claims 1, 3, 4, 6, 9-14, 16, 17, 19-23, 28, 29, 31, and 33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Jayaraman in view of any one of Kirsten, McCormack and Pennisi. Claims 1, 3, 4, 6, 7, 9-14, 16, 17, 19-23, 28, 29, 31, and 33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nguyen in view of Jayaraman.

Appellant does not set forth separate arguments for any particular claim on appeal. Accordingly, the groups of claims separately rejected by the Examiner stand or fall together.

We have thoroughly reviewed each of Appellant's arguments for patentability. However, we find that the Examiner's rejections are well-founded and supported by the prior art evidence relied upon. Accordingly, we will sustain the Examiner's rejections for the reasons set forth in the Answer, which we incorporate herein, and we add the following for emphasis only.

We consider first the Examiner's § 102 rejection of Nguyen. The principal argument advanced by Appellant is that Nguyen does not teach that the polymer matrix cures such that the adhesive paste hardens. Appellant cites paragraphs [0020], [0022], and [0027] of the present Specification to support the argument that Appellant "intends 'harden' to indicate a particular type of curing, rather than to be a synonym for 'cure'" (Principal Br. 6, last para.). According to Appellant, a cured polymer is one that "has become set but not necessarily hard, whereas a polymer that has *hardened* is one that has in fact become hard" (Principal Br. 7, second para.). Appellant contends that "Nguyen does not teach hardening of the polymer as the term is used in

the present application because the reference states that the cured polymer forms 'a compliant elastomer'" (*id.*).

Like the Examiner, we find no merit in Appellant's argument that the polymeric curing disclosed by Nguyen does not meet the claim requirement for hardening. Nguyen, like Appellant, describes a method of dissipating heat generated by an electronic component using a thermal adhesive comprising a mixture of a curing polymer composition, a solder powder, and a fluxing agent wherein heat applied to the polymer mixture causes solder reflow which forms interconnecting metal structures dispersed in the polymer matrix. Nguyen teaches that the composition can be cured as desired to provide a cross-linkable elastomer film, such as "a high tough elastomer network of higher cross-linked density" (page 2, para. [0021]). Manifestly, notwithstanding the elastomeric nature of the cross-linked composition, it can hardly be gainsaid that the cured, cross-linked polymeric composition of Nguyen hardens upon curing. Also, as pointed out by the Examiner, the curable compositions of Nguyen, like Appellant's composition, do not degrade during thermal cycling. In addition, it is significant that the appealed claims fail to specify any degree of hardening which distinguishes the cured compositions encompassed by the Appealed claims from those fairly described by Nguyen.

We also agree with the Examiner that the portions of the Specification cited by Appellant do not provide separate definitions for the terms curing and hardening. Paragraph [0020] simply states, *inter alia*, "the polymer is thermosetting and the polymer composition is formulated to allow a solder to melt and reflow before the adhesive hardens." Hence, as is widely understood in the polymer art, the thermosetting or curing step hardens the

composition. Paragraph [0022] does not mention hardening but states "after being cured the polymer should provide good adhesion and have sufficient elasticity to absorb any stresses generated by thermal cycling or other mechanical causes." Hence, the curing step is synonymous with or, causes, hardening. Paragraph [0027] states that the composition is "further heated at a different temperature to cure the polymer" and that the temperature is "then ramped to the optimal temperature for hardening the polymer." Thus, it can be seen that the Specification teaches that the higher different temperature both cures and hardens the polymer, rendering the terms essentially synonymous. Accordingly, we find that Appellant's Specification provides no basis for Appellant's argument that there is a meaningful distinction between curing and hardening such that the curing taught by the applied prior art cannot be reasonably considered to be hardening.

Turning to the § 103 rejection of Jayaraman in view of Kirsten, McCormack or Pennisi, we agree with the Examiner that the reference cooling to cure and harden the polymer composition meets the claim requirement for curing and hardening the adhesive composition. Although the thermal interface materials of Jayaraman become a thick fluid at operating temperature, they become solid at room temperature during the cooling step which brings about a cure and hardening of the composition. We note that one of the definitions of "cure" is to encourage hardening and, as noted above, the term is understood in the polymer art as a hardening of a polymer composition.

We also agree with the Examiner that Kirsten, McCormack, and Pennisi evidence the obviousness of incorporating a fluxing agent in the thermally conductive adhesive composition of Jayaraman for the purpose of

removing surface oxides from the solder powder to enable it to better wet out. We note that Appellant's Specification teaches the same purpose for using the fluxing agent. While Appellant raises the question of whether the addition of a fluxing agent in the thermal interface materials of Jayaraman would render the composition inoperable or ineffective, Appellant has advanced no rationale why one of ordinary skill in the art might expect such a deleterious effect. On the other hand, Appellant has not refuted the Examiner's reasoning set forth below:

> Jayaraman et al. suggest ten non-fusible fillers only two of which are metal oxides (Column 10, lines 42-50) such that in the majority of the embodiments suggested by Jayaraman et al. inclusion of a fluxing agent would not have affected the adhesive other than to remove surface oxides from the solder powder and even in those embodiments wherein non-fusible filler comprises a metal oxide the fluxing agent is added to remove *surface* oxides from the solder powder and absent any evidence otherwise the fluxing agent would not effect [sic] the non-fusible filler particles which not only have a size much larger than that of a *surface* oxide but have a much larger size than the solder particle itself (Figures 4A and 4B). (Ans.. para. bridging pages 21-22).

Appellant also maintains that "[t]he properties of the polymers of Jayaraman et al. and the present invention are fundamentally different, even though they may contain some of the same substances" (Principal Br. 9, last para.). However, as emphasized by the Examiner, any difference between the polymers of Jayaraman and Appellant are not reflected in the appealed claims which encompass any curable polymer composition that hardens upon curing. As explained by the Examiner, the appealed claims embrace polymers that change phase when heated and harden when cured by cooling.

As a final point, we note that Appellant bases no argument upon objective evidence of nonobviousness, such as unexpected results.

In conclusion, based on the foregoing and the reasons well stated by the Examiner, the Examiner's decision rejecting the appealed claims is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv)(effective Sept. 13, 2004).

AFFIRMED

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